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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,800	01/24/2004	Larry S. Eoff	2003-IP-009464U1	1654

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EXAMINER	
FIGUEROA, JOHN J	
ART UNIT	**PAPER NUMBER**
1712	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/763,800	EOFF ET AL.	
	Examiner	Art Unit	
	John J. Figueroa	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,10-14,21,24-29 and 99-145* is/are pending in the application.

4a) Of the above claim(s) *100-105, 112-115, 121, 122, 133-136,142 and 143* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5, 10-14, 21, 24-29, 99, 106-111, 116-120, 123-132, 137-141,144 and 145* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. Receipt is acknowledged of a request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e) and a submission, filed on December 12, 2006.

Double Patenting

2. The double patenting rejections, items 11-17 on pages 6-10 of the Office Action of March 23, 2006 have been withdrawn in view of the terminal disclaimer filed with Applicant's amendment/response of June 23, 2006.

Election/Restrictions

3. A restriction requirement had been presented in the prior Office Action of March 23, 2006. Applicant had elected Group I (shown below). New claims 99-145 have been included with this group and thus considered in the instant Office Action.

I. Claims 1-5, 10-14, 21, 24-29 and 99-145, drawn to a method of performing an injection operation including introducing a relative permeability modifier (RPM) comprising a hydrophobically modified water-soluble polymer, classified in class 507, subclass 110.

4. An election of species for the hydrophilic polymer was required (items 7-8 of the Office Action of 3/23/2006) and Applicant elected, without traverse, "chitosan" as the species to be examined. Thus, claims 100-105, 112-115, 121, 122, 133-136, 142 and 143 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-5, 10, 12, 14, 21, 24-29, 99, 106-111, 117, 119, 120, 123-132, 138, 140, 141, 144 and 145 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent Number (USPN) 4,532,052 to Weaver et al. (hereinafter 'Weaver').

Weaver discloses a method for fracturing, and/or diverting fluids within, a subterranean formation to substantially alter the fluid flow (permeability) and/or surface characteristics of the formation, said method including injecting into the formation an aqueous composition that can alter the properties of organic/aqueous fluids, said composition containing a branched water-soluble organic polymer containing unit(s), having a molecular weight of 900 to 50,000,000, that can be hydrophilic, hydrophobic or a combination thereof, and can further include a gelling agent and/or a proppant. (Abstract; col. 5, lines 1-10 and 30-65; col. 6, lines 29-65; col. 7, lines 7-33; col. 9, lines

32-37 and 49-63; col. 20, line 65 to col. 21, line 6; col. 21, lines 49-63; col. 38, lines 37-51; col. 39, lines 24-36; *See particularly,* col. 8, lines 41-67; *See also,* Table 6 on col. 53-54 disclosing data of aqueous fluid diverting and water permeability reduction properties for an aqueous fluid containing a methoxypolyethylene oxide branched polydimethylaminoethyl methacrylate copolymer, sand, silica flour and bentonite)

For example, an exemplary polymer disclosed in Weaver for treating subterranean oil producing formations has a cationic hydrophilic backbone modified with hydrophobic branches providing a desired hydrophobic-hydrophilic within the formation, thus altering the surface characteristic of the formation and the fluid flow or resistance to flow relative to a particular fluid, wherein the hydrophilic nature of the branched polymer serves as an aqueous gelling agent that provides for an increase in fluid viscosity. (Col. 5, lines 11-16; col. 6, line 65 to col. 7, line 40; col. 7, line 63 to col. 8, line 21; col. 10, lines 56-59; Table on col. 9-10) In Tables 23-28, Weaver discloses data for examples of treating a well by injecting into the well an aqueous solution containing a cationic polymer with nonionic branches.

Weaver discloses that the water-soluble branched polymer can have, in its backbone chain and/or in its branch chain, one or more heteroatom or groups, such as nitrogen, oxygen, phosphorous, sulfur, sulfur groups, amide, carboxyamide and carbonyl. (Col. 14, lines 17-23 and 52-59) The polymer units in either chain can be –R-X-, wherein R is a C_1 to C_6 alkyl radical and X represents a heteroatom and are preferably capped. (Col. 19, lines 36-65) Particularly, branched polymers containing polyamine and polyether linkages in the branches are preferred for altering fluid flow

properties in the formation and are especially effective and stable at temperatures above 177°C. (Col. 13, lines 1-18)

Among the monomers disclosed in Weaver that can be used to form the branched polymer include dimethylaminoethyl methacrylate, acrylic esters, acrylamide, epichlorohydrin and chloroprene; wherein the polymeric unit/group can be derived from, e.g., saccharide or a derivative thereof (including cellulose and starch), vinyl, diallylic, amide or ether monomeric units, as long as it has the desired hydrophilic-hydrophobic property. (Col. 19, lines 7-10; col. 19, line 66 to col. 20, line 29; col. 22, lines 47-65) The vinyl or diene polymer units are represented by (Class I, structure on col. 23); the amine type polymer units (Class III, structure on col. 24-25); the amide type polymer units (Class IV, structure on col. 25); whereas the saccharide and saccharide derivative units (Class V) are represented by the chemical structure depicted on col. 25-26, lines 43-59. (*See also*, the examples of class V on col. 35-36)

Weaver further discloses that a preferred class of polymers for altering aqueous fluid properties, such as altering water-oil ratio in a formation process and enhancing oil production, are polymers containing 2-hydroxylpropyl N,N dialkyl-amine as backbone units and acrylamide (organic acid derivative) and/or epichlorohydrin reacted polyalkoxide as the branch units. (Col. 42, lines 31-37) In Procedure O beginning on col. 50, line 5, Weaver discloses an example of altering the permeability of a formation surface (change in water-oil ratio) by injecting into the formation a copolymer of polydimethylaminoethyl methacrylate (PDMAEM having MW of 1 million) grafted with a polyethylene oxide branch (PEO, MW of 15,000). The resulting data showing reduction

in water permeability of the formation is shown in Tables 7 and 8. (*See also* Tables 10-13 on col. 57-59 for permeability data of an aqueous treating solution containing 1% of a hydrophilic PDMAEM polymer (MW of 600-800K) branched with a hydrophobic methoxy-polyethylene glycol epichlorohydrin (MPEO) adduct; particularly, polymer #7 of Table 10). In Tables 14-15 on col. 59, Weaver further discloses PDMAEM:PEO/MPEO weight ratios for the branched polymer ranging from 0.5:1.0 to 1.25 to 0.25.

Regarding the limitation in independent claims 1, 106 and 127 concerning the hydrophobically modified water-soluble polymer reducing the permeability of the subterranean formation to an aqueous-based fluid, Weaver discloses results demonstrating reduction in water permeability in the same examples containing the modified polymer discussed above (immediately preceding paragraph) in Tables 10-13 and 14-14 on col. 57-60. (*See, e.g.,* Sample #7 on Table 10, showing a reduction in water permeability of 85%)

Finally, regarding the limitation in claim 125 concerning "metering" the RPM into an injection stream comprising the aqueous injection fluid, in the absence of guidance from the specification, the term "metering" has been given its broadest interpretation as another term for "providing" the RPM to the well via injection, which is encompassed by Weaver as discussed above.

Thus, the claims are anticipated by Weaver.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 11-14, 116-119 and 137-140 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weaver in view of USPN 6,358,889 B2 to Waggenspack et al (hereinafter 'Waggenspack').

Weaver was discussed above. Weaver discloses the hydrophobic branch attached to the backbone of the hydrophilic polymer to contain an ester or amide. However Weaver does not specifically disclose the hydrophobic branch to be a succinic acid derivative.

On the other hand, Waggenspack teaches well drilling and servicing fluids that include an aqueous fluid containing a hydrophobically modified chitosan polymer (a glucosamine polysaccharide derivative), wherein said modified chitosan polymer is formed from the in-situ reaction of a chitosan polymer with an anhydride modifying compound, such as succinic anhydride, dodecynylsuccinic anhydride or any other alkenyl succinic anhydride having a C_2 to C_{20} alkenyl chain. (Abstract; col. 3, line 65 to col. 4, line 6; col. 5, lines 33-65; col. 14, lines 48-67; Example 1)

Waggenspack further teaches that adding the modified chitosan water-soluble polymer increases the viscosity of the aqueous fracturing/servicing fluid, thus providing

the fluid with enhanced low shear rate viscosity that is shear thinning. (Col. 1, lines 15-22 and 36-57; col. 3, lines 13-21)

Therefore, it would have been obvious to a person of ordinary skill in the art at the time that the invention was made to use the modified chitosan copolymer taught in Waggenspack as the hydrophobically modified hydrophilic polymer injected in Weaver's method of acidizing a subterranean formation. It would have been obvious for one skilled in the art to do so to attain a more cost-effective method of acidizing by using a more viscous aqueous fluid having superior shear properties as taught by Waggenspack, and thus efficiently attain a desired level of surface permeability of the subterranean formation.

Thus, the claims are unpatentable over Weaver and Waggenspack.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John J. Figueroa whose telephone number is (571) 272-8916. The examiner can normally be reached on Mon-Thurs & alt. Fri 8:00-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JJF/RAG

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